Civil Air Patrol

Common Failures, CRM and Aviation

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Agenda

- Discuss and review common CAPF 5 and CAPF 91 checkride failures
- Why CRM is important and its impact on aviation safety
- Examine the role of CRM in aircraft accidents and incidents
- Review key CRM concepts and methodologies
- Examine how situational awareness can be lost and regained and how CRM tools can assist us in these situations

- Phil Blank
  - CFII/MEI
  - ASEL/AMEL ATP B727 B737 CE500 CE525S EMB120
  - FEJ
  - 8900 hours and still learning!!!

Common CAP Checkride Failures

- **CAP 5 Checkride Failures**:
  - Lack of documentation (e.g. logbooks, test results, regulations)
  - No prep for maneuvers (last stall series was the previous year's CAPF 5)
  - Unable to demonstrate proficiency with basic aircraft equipment (esp. G1000)

- **CAP 91 Checkride Failures**:
- Over dependence on electronic equipment during search efforts
- Over focus on search objectives creating possible CFR violations
- Inability to fly aircraft in specified configuration (e.g. 10 flaps 90 knots)

Something to think about

- **Average number of death due to medical error per year**
  - Leapfrog group – 400,000 per year
  - John's Hopkins – 10% of all deaths in the US due to medical error
  - Thought to be third leading cause of death in the U.S.

- **What would happen if this were aviation? Our record is a bit better. . .**

- **How many fatalities per year worldwide in commercial aviation since 2009**
  - **405 fatalities per year on average**
  - **U.S has only had four accidents since 2009**
  - **5 fatalities total (four on the ground in SFO – one inflight struck by fan blade)**

Introduction – Important Items for Success

- First objective – don't crash
- Standard Operating Procedures are a must – watch out for normalization of deviance
- Role definitions are critical with each person understanding their role
- Style accommodations are important but never to compromise safety
- Forgive and remember
  - Most aviation rules are etched in blood
  - Mechanical failure is exceedingly rare
  - Almost all accidents are due to human factors
- CRM (Cockpit Resource Management) was developed to assist in Aviation Leadership and improved safety

Operating in a critical environment

- The PIC of the aircraft is not God!
- Significant accidents have occurred when ‘crew’ input is not heard or processed
- Critical thinking is important – don’t be locked into expectation bias
- Most accidents due to the crew losing situational awareness
- Most accidents due to lack of leadership or communication amongst the aircrew
- Risk management is an important piece of the assessment puzzle

One easy to understand Risk Management Model

Probability / Severity	A Catastrophic	B Hazardous	C Major	D Minor	E Negligible
5 Frequent	5A	5B	5C	5D	5E
4 Occasional	4A	4B	4C	4D	4E
3 Remote	3A	3B	3C	3D	3E
2 Improbable	2A	2B	2C	2D	2E
1 Extremely imp	1A	1B	1C	1D	1E

Unacceptable region – Mitigation of risk is neccessary

Tolerable region – Acceptable based on risk assessment and mitigation (if necessary). It may require management decision.

Acceptable region

Risk mitigation: Risks should be managed to be as low as reasonably practicable. Risk must be balanced against the time, cost and difficulty of taking measures to reduce or eliminate the risk. The level of risk can be lowered by reducing the severity of the potential consequences, reducing the probability of occurrence or by reducing exposure to that risk.

Leadership Styles in aviation

- **Authoritarian –** PIC is God!
- **Paternalistic –** I am your father and expect loyalty
- **Use the force** “What, you didn’t know what I was thinking?”
- **Consensus –** we must all agree
- **Laissez-faire –** you are all grown up – do what you need to do
- **Transactional –** don’t think just do what the book says
- **Transformational – CRM – a leader who evaluates the changing dynamic situation and does not get ‘locked’ into a single course of action. Who listens and acts on the inputs of those around them.**
- **GA CHALLENGE:** Most of us have been trained for Single Pilot operations**.**
- **FAA Guidance: Six Aspects of Single Pilot Resource Management is a great place to start!**

Remember this?

ONE CIVIL AIR PATROL, EXCELLING IN SERVICE TO OUR NATION AND OUR MEMBERS!

When it doesn't work

- **Turkish Airlines Flight 981 – cargo door blew off – explosive decompression**
  - Ground crew not properly trained on door closure
  - Known design flaw in DC-10 (risk assessment – mitigation ineffective)
  - American Airlines had identical incident six years earlier but no fatalities
- **Tenerife**
  - Captain did not fully listen to input of crew
  - KLM took off without confirming that they had in fact been cleared
  - Poor weather and lack of risk assessment
- **Japan Airlines 747**
  - Rear of aircraft blew out severing controls
  - Tail strike seven years earlier improperly repaired
  - Repair done by Boeing maintenance technicians pressured to 'go fast'

When it doesn't work

- **Aloha Airlines 243 (a hard lesson)**
  - Top of aircraft cabin tore off during pressurization cycle
  - Massive and previously unknown corrosion found
  - Mandatory Aircraft Aging program instituted – older types force retired
- **Air France 447**
  - Pilots distracted by automation
  - Stall warning sounded for 54 seconds – crew did not properly react
  - All commercial pilot training now includes upset/stall training
- **United Flight 173**
  - Captain describe as 'arrogant SOB'
  - Airplane ran out of fuel
  - Investigating an indicator light – did not head crew concerns about fuel

When it works!

- **United Airlines 232**
  - Mechanical failure of compressor blade severed all hydraulic lines
  - Check pilot in back of aircraft went to cockpit to assist
  - Literally four pilots flew the aircraft

- **One of the big ‘saves’ for Leadership principles behind CRM**

- ...the preparation that paid off for the crew was something called **Cockpit Resource Management**.... Up until 1980, we kind of worked on the concept that the **captain was THE authority** on the aircraft. What he said, goes. And we lost airplanes because of that. Sometimes the **captain isn't as smart as we thought he was**. And we would listen to him, and do what he said, and we wouldn't know what he's talking about.

  And we had 103 years of flying experience there in the cockpit, trying to get that airplane on the ground, not one minute of which we had actually practiced [under those failure conditions], any one of us. **So why would I know more about getting that airplane on the ground under those conditions than the other three**. So if I hadn't used [CRM], if we had not let everybody put their input in, it's a cinch we wouldn't have made it

When it works!

- **Air Canada Flight 143**
  - Aircraft ran out of fuel at 41,000 feet due to fueling error
  - Pilots threw out manual and improvised based on one pilot having glider experience
  - Safely landed at abandoned WWII airfield

- **US Airways Flight 1549**
  - Aircraft struck flock of birds after take off
  - Was less than 3,000 feet off the ground
  - Crew coordination contributed significantly with saving everyone on board

Let’s watch one

- https://www.youtube.com/watch?v=8MFPSfGoT1U&feature=youtu.be

CRM thoughts from our friends at FSI

COMMUNICATIONS

- ATC uses standardized communications – so should we
  - Wow, look at that airplane vs. wow, look at the big grey propeller airplane with the dented left wing heading right for us on the taxiway!
  - We have lost an engine vs. the right engine is no longer attached to the nacelle (yes, this has happened!)
- **And most importantly:**
  - Does this look good to you vs. I am extremely uncomfortable with this approach (Agree and pre-brief ‘Knock it off’ call).

FSI – CRM problem resolution model

- Time – how much time do you have to act. Not everything is an ‘immediate action’. Only memory items should be considered.
- Diagnose – What is happening? Objective based on presented information.
- Options – What can we do about the situation we have identified above?
- Decide – choose a course of action
- Act – Implement and evaluate the result. Repeat as necessary.

Preventing loss of SA

- Delegate during periods of high workloads
- Express concerns and solicit information if in doubt of situation or outcome
- Monitor, evaluate and verbalize as necessary – communicate
- Focus on relevant details – focus on what is in front of you – don't let the distractors get in the way of solving the issue
- Project ahead and consider various outcomes and develop contingencies
- Create visual and aural reminders for unusual configurations or to assist in managing interruptions

How to see it coming (red flags)

- Undocumented procedures (normalization of deviance)
- Need to hurry or last minute changes
- Fatigue
- Ambiguous or confusing information
- Fixation
- Unexpected change in airplane state or unusual reaction to inputs
- Failure to
  - Fly the plane or look outside (everyone is heads down)
  - Comply with SOPs, Regulations, limitations or other guidance
  - Resolve discrepancies
  - Communication effectively

It got me – now what???

- Recognize and **admit** you have lost SA and communicate effectively
- Climb and achieve safe altitude – it is your friend
- Stabilize the aircraft as necessary
- Create time and space - even with ATC
- Seek information from all sources – aural/visual/experience level and your partner
- Resolve uncertainty or ambiguity (scratch the itch)
- Ask why SA was lost and learn from it
- Avoid critical flight segments until you have re-established and you are ready

CRM – putting it all together

- What are some of the principles of CRM Leadership interaction:
  - Have an attention getter (an alert)
  - State your concern (clearly)
  - Suggest a solution (always)
  - Obtain Agreement or buy-in
- Operate from a common ground and a common goal
- Be prepared and be prepared to lead
- When facing failure, don't focus on blame – focus on learning and remembering
- Communicate early and often
- Focus on the outcome – what you are trying to achieve

Non Aviation CRM Reading list

- **Why Hospitals Should Fly – How to improve patient safety (John Nance)**
  - **Focuses on Human Factors, Assumption and Botched communications and SOPs**
- **Forgive and Remember: Managing Medical Error (Charles Bosk)**
  - **Focuses on the training of surgeons and managing the challenge of human errors**
- **Turn the Ship Around – Turning followers into Leaders (David Marquet)**
  - **Focuses on developing leadership in a command and control environment**

Questions, comments, thoughts

Thank you!

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